2. SURVEY METHODS AND RESULTS APPLICATION

This chapter summarizes the 1999 WSF Travel Survey design process, methodology, administration and response statistics. The context of the survey data and subsequent analysis is framed in terms of response rates, usable survey records, survey expansion, response precision estimates, and other applications of the results. Elements of the survey related to geographic information system (GIS) applications and travel demand forecasting, including a description of the address geocoding process and the WSF transportation analysis zonal system, are also presented.

2.1 SURVEY ADMINISTRATION AND CODING

This section summarizes the sampling plan, administration, and coding of the WSF travel survey. Readers seeking additional information regarding these topics are referred to the *WSF 1999 Travel Survey: Technical Report of Methods* dated March 2000 and prepared by Nustats for Washington State Ferries as part of this study.

2.1.1 Survey Periods and Sampling Plan

The survey sampling plan called for administering a travel survey to a sample of weekday and Sunday ferry users during the month of May. May is the best month for surveying, not only for comparability to the May 1993 travel survey, but also because daily ridership levels in May most closely approximate annual average daily ridership, capturing both regular users and some of the recreational users that frequent the system during the peak summer season. Each route was surveyed for specific survey periods on one midweek day and one Sunday. A specific sampling plan was developed to obtain travel information from users during the weekday PM peak period, the remaining non-peak PM hours of the day (PM non-peak period), and Sunday. For the PM peak period, survey questionnaires were offered to all persons age 15 or older on every vessel sailing departing between 3 and 7 PM on the particular Tuesday, Wednesday, or Thursday that each route was surveyed. PM non-peak survey period riders were surveyed on the same days as the PM peak period survey from a sample of at least 50% of the vessel sailings that occurred during the non-peak PM hours. When appropriately expanded, the two weekday survey periods combined represent the travel patterns for the PM half day ridership.[1]

On Sunday, the six hour block of consecutive vessel sailings that maximized boardings on each route were sampled, with survey questionnaires offered to each rider age 15 or older. Differences in schedules and travel patterns means that routes may have been surveyed at somewhat different times or for a differing number of vessel sailings. The Sunday survey is intended to provide additional information about weekend ferry use without expanding the survey data to be representative of overall Sunday or weekend travel patterns.

[1] Two exceptions are the international and domestic San Juan Island routes, which were expanded to daily ridership, thus making no distinction between the PM peak and PM non-peak periods.

2.1.2 Survey Administration

With a few notable exceptions, the 1999 WSF Travel Survey was administered as planned during the three survey periods. Logistical issues and the desire to avoid the atypical travel patterns on the Memorial Day holiday weekend caused the Sunday survey of the Edmonds-Kingston route to be pushed back to the first weekend in June. Bad luck plagued the weekday survey administration on the Fauntleroy-Vashon-Southworth triangle routes. A vessel broke down just after the weekday survey was underway, disrupting service and altering schedules as remaining vessels were reallocated in an attempt to balance service to the three locations. This caused a number of passengers to change their travel plans and/or become disgruntled, both of which reduced the survey response well below target levels. It also foiled efforts to collect detailed boarding and alighting counts by terminal and vessel in order to produce ridership control totals for the three individual routes by sailing.

In light of these problems, a re-survey of the Fauntleroy-Vashon-Southworth triangle routes was scheduled for a weekday in early June. Unfortunately, a similar service disruption occurred on this day as well, resulting in an inadequate rider sample and a sub-par response rate. Recognizing that the next opportunity to re-survey this route on a weekday would put the date well into the peak season and school year summer break, and not wanting to test the good-will of riders on this route with yet another survey, it was decided to postpone a further re-survey of the Fauntleroy-Vashon-Southworth routes until the end of September. On Tuesday, September 28, the Fauntleroy-Vashon-Southworth route trio was re-surveyed along with the Seattle-Vashon passenger-only route. The passenger-only route was included for calibration purposes to properly account for the many riders on the Southworth-Vashon route make the transfer to and from the passenger-only route to downtown Seattle via Vashon.

2.2 SURVEY RESPONSE TRENDS

Nearly 50,000 questionnaires were distributed system-wide to weekday and Sunday passengers on the sampled vessel sailings, and over 18,000 of these were returned. Field screening for completeness and accuracy reduced this yield slightly to 17,895 questionnaires available for computer scan coding of question responses. Computerized scanning of survey questionnaires was employed for all survey responses except for the reported addresses for the rider's trip origin, trip destination, and home location, which were manually entered for subsequent latitude/longitude geocoding. After data processing and iterative, thorough quality review, there were 15,092 general usable survey records for the three combined survey periods, and 14,732 trip table usable records.

2.2.1 Usable Survey Records

Survey records deemed usable for tabulation and analysis have been divided into two categories: ***general usable*** and ***trip table usable***. A general usable record is defined as survey data for one respondent that is judged complete and valid for analysis purposes. To meet the general usable criteria, a survey record must include:

- Indication of the trip purpose;

- Indication of the boarding method as in-vehicle or walk-on, and if the latter, further indication of the access mode to the departure ferry terminal and the egress mode from the arrival ferry terminal; ***and***
- Geocodable address information for the respondent's trip origin and destination that are either:

  Sufficiently dissimilar geographically to be consistent with the one-way trip (ferry crossing) surveyed; ***or***

  Geographically similar but with a reported trip purpose of sightseeing, indicating that the respondent made a continuous round-trip, beginning and ending at the same ferry terminal.

Because the survey questionnaire was designed to gather data about a one-way trip, it was necessary to exclude those records for the small percentage of respondents who erroneously provided information about a round-trip from the general usable category. One exception was made for respondents who indicated that they were making a continuous round-trip with the sole purpose of "sightseeing", effectively boarding and alighting at the same ferry terminal. For these cases, the ferry component of a respondent's one-way trip and round-trip are indistinguishable.

Survey records categorized as trip table usable, further restricts the general usable survey records by eliminating the above round-trip exception concerning those respondents making a continuous "sightseeing" purpose round-trip.

2.2.2 Response and Usable Rates

Table 2-1 presents the survey response statistics and usable rates for both sets of usable records by survey period. The 1999 survey results are also compared to the previous survey in 1993. Response rates are measured by dividing the number usable records by category into the relevant total number of surveys distributed. Usable rates are calculated by dividing the number of usable records (by category) into the relevant number of surveys that were returned and coded.

In most cases regarding queries and tabulations of general ferry use, it is appropriate to use the set of general usable records. For the weekday survey periods, when expanded using the supplied expansion factors, it is this set of data that gives the expected ridership by the PM peak and PM non-peak periods. For a few applications, such as mapping one-way trip origins and destinations, and applying the WSF travel demand forecasting model, it may be appropriate to use the slightly reduced subset of trip table usable records where the sightseeing continuous round-trip records have been screened out.

Table 2-1
Survey Distribution, Response and Usable Record Rates

Survey Category	May 1999 Travel Survey				May 1993 Travel Survey		
	Total	Weekday PM Peak	WD PM Non-Peak	Sunday	Total	Weekday PM Peak	Sunday
Surveys Distributed	49,620	19,859	7,477	22,284	33,202	16,169	17,033
Surveys Returned and Coded	17,895	8,695	2,350	6,850	15,750	8,299	7,451
Less: Missing Required Data Fields	(947)	(622)	(111)	(214)	(1,918)	(1,003)	(915)
Trip O & D too Similar / Incomplete / Inconsistent	(1,856)	(648)	(273)	(935)	—	—	—
Usable Records for General Tabulation	15,092	7,425	1,966	5,701	13,832	7,296	6,536
Less: Trip O & D too Similar / Incomplete / Inconsistent	—	—	—	—	(5,822)	(2,582)	(3,240)
Usable w/ Trip Purpose Sightseeing & Similar O & D	(353)	(72)	(30)	(251)	N/A	N/A	N/A
Usable Records for Trip Table Analysis (One-Way Trip Origins and Destinations)	14,739	7,353	1,936	5,450	8,010	4,714	3,296
Response Rates							
General Usable Response Rate	30.4%	37.4%	26.3%	25.6%	41.7%	45.1%	38.4%
Trip Table Usable Response Rate	29.7%	37.0%	25.9%	24.5%	24.1%	29.2%	19.4%
Usable Rates							
General Usable Record Rate	84.3%	85.4%	83.7%	83.2%	87.8%	87.9%	87.7%
Trip Table Usable Record Rate	82.4%	84.6%	82.4%	79.6%	50.9%	56.8%	44.2%

Comparison to 1993 Survey

A more stringent definition for "general usable" survey records for the 1999 survey resulted in a lower general usable response rate than in 1993; however, the comparison is not equally based. In 1999, a general usable record was required to have consistent and complete trip origin and destination information (among other criteria discussed above) whereas the 1993 survey did not require that the trip origin and destination locations be consistent as long as the direction of travel was indicated, hence the higher general usable response rates. On the whole, the 1999 general usable response rates were very respectable, averaging 37% for the combined weekday survey periods, nearly 26% for Sunday, and 30% overall. The weekday response rate was expected to be higher due to its larger share of regular users with a vested interest in ferry service, and thus, more inclined as a group to provide feedback.[2]

A better comparison of response rates between the 1999 and 1993 surveys can be made using the trip table usable records, which only includes records with complete and consistent trip origin and destination information in both surveys. As shown in Table 2-1, the overall trip table usable response rate for 1999 was nearly 30%, compared to the 24% achieved in 1993. In both cases, weekday users were more likely to return completed questionnaires.

It is interesting to note that despite a higher trip table usable response rate in 1999, the raw return rate (the number of surveys returned and coded divided by the number of surveys distributed) was actually lower in 1999 (36%) than in 1993 (47%). This means that although

[2] In addition, the weekday survey data received additional scrutiny and data entry quality checks of trip origins and destination due to its intended use in the WSF travel forecasting model, which may have contributed to its higher usable rates.

"Although riders in 1999 appeared less willing to participate in the survey, those that did, filled out the form more accurately than riders in 1993."

riders in 1999 appeared less willing to participate in the survey, those that did filled out the form more accurately than the respondents in 1993.

In fact, this result is confirmed by looking at the comparable trip table usable rates for the two survey years. For 1999, nearly 82% of the surveys that were returned and coded yielded complete and consistent trip origin and destination information, compared to 51% in 1993. This may be attributable to the shorter questionnaire form used in 1999, as well as to "capturing" those people most interested in assisting with the research, given that a smaller percentage of people opted to complete the survey than in 1993. For the PM peak survey period data which will be used to update the WSF travel demand forecasting model, a total of 7,252 trip table usable records are available, an increase of 54% over the 4,714 records available in 1993.

2.2.3 Expansion Factors

Simple numeric tabulations of the survey results represent subsets of the populations of all riders on each route that participated in the survey and sufficiently completed their questionnaires so that they were deemed general usable. In order to present the survey results as representative of the survey period population of riders, it is necessary to expand the usable numbers to reflect the actual ridership that occurred by various subcategories on the respective survey days. Thus, expansion factors are calculated to adjust the usable responses back up to the actual survey period ridership — as if all ferry riders had actually completed the survey and all completed surveys perfectly usable. Expanding the usable survey responses requires accurate ridership counts by route, vessel sailing and direction, and boarding method to provide the correct expansion targets.

Sunday Survey Period Expansion Issues

It was decided early on not to expand the Sunday survey data to either a peak period or daily ridership level. Generally, it would make the most sense to expand Sunday usable survey records to daily travel patterns, since there is no uniform peak period that applies to all routes. However, not all of the daily ridership data required for such an expansion exists. This is because WSF does not collect actual ridership data where tickets are not sold, instead, it counts double at those locations and for those modes where round-trip tickets are sold in one direction.[3] This counting method would not pose a problem for daily expansion if Sunday travel were directionally balanced within the day; however, much of Sunday travel represents the return leg of a trip using the ferry that began on a preceding day, typically a Friday or Saturday. As a result, the Sunday survey results were not expanded, and are presented with the objective of showing the representative travel patterns and distributions of the survey respondents rather than actual (expanded) ridership volumes. Because persons boarding in vehicles, especially passengers of the vehicles tend to be less

[3] This method does provide sufficiently accurate ridership counts for all routes when aggregated over a time period of one week or greater.

likely to fill out a survey, results tabulated by boarding mode based upon the unexpanded Sunday survey results may be biased toward under representing in-vehicle riders.

Weekday Survey Period Expansion Issues

"The Sunday survey results were not expanded, and are presented with the objective of showing the representative travel patterns of the survey respondents…. The weekday PM peak and PM non-peak survey results have been expanded to be representative of their respective survey period ridership."

The weekday PM peak and PM non-peak survey results have been expanded to be representative of their respective survey period ridership populations using actual ridership data for these intra-day time periods. Two sources exist for this data: WSF ticket sales and survey day boarding counts. In most cases, boarding counts (and where necessary for vessels serving multiple destinations/routes, alighting counts) were conducted as part of the fielding process during the survey periods, with separate counts by boarding method (in-vehicle and walk-on.) The boarding count method represents a relatively accurate source for survey period ridership, though in some cases, it was difficult to count all vehicle passengers, particularly for vehicles arriving at the last possible moment and boarding without stopping. Similarly, there were cases on the larger routes where the rush of walk-on passenger volumes just prior to departure may have exceeded the ability of survey workers to accurately count boardings.

WSF's point-of-sale ticket system, which is linked to the Traffic Statistics System database, also provides ridership counts by route vessel sailing, direction, and mode for terminals and modes where tickets are sold. This provided a good source of data for assessing the accuracy of the boarding counts, calibrating the walk-on and vehicle passenger boarding counts from known vehicle/driver ticket sales, and identifying areas where problems may have occurred. Through careful review, an algorithm was developed for determining which of the two ridership sources provided the best true survey period ridership estimates, from which the expansion targets and resulting expansion factors were developed. This process resulted in using a combination of ticket sales data and survey boarding counts to establish the necessary survey period expansion targets.

PM Peak Period Expansion Factors

The PM peak period was defined as the four hours between 3 and 7 PM, and surveys were typically distributed to every adult rider on all routes for vessel sailings scheduled to begin within this interval. Therefore, the PM peak period expansion factors were calculated by dividing the number of usable responses for each combination of route, direction and boarding mode into the associated survey period ridership.

The exception to this rule occurred for the domestic and international San Juan routes, where given the longer headways and less frequent service (there is only one round-trip per day for the international route to Sidney, B.C.), any daily vessel sailing was considered peak, regardless of whether it actually occurred in the defined PM peak period. Therefore,

the expansion factors for these two routes were calculated by dividing the number of usable responses for each combination of route, direction and boarding mode into the associated daily ridership.

Overall, the 7,425 usable survey records obtained correspond to an expanded weekday PM peak survey period ridership base of 26,494 ferry users, which corresponds to an average expansion factor of 3.59.

PM Non-Peak Period Expansion Factors

The PM non-peak period generally represents the non-peak PM hours of the day — those PM hours outside of the 3-7 PM window. Although questionnaires were distributed to every adult rider on all routes for vessel sailings surveyed, not all vessel sailings in the PM non-peak time period were surveyed. As such, the expansion factors for the PM non-peak period generally included a response factor component and a boarding factor component. The response factors expanded the usable survey records to the actual ridership on all of the sampled sailings by route, direction and boarding mode. The boarding factor then expanded the number of sampled sailing by route to the total number of vessel sailings in the PM non-peak period.

Overall, the 1,966 usable survey records obtained correspond to an expanded weekday PM non-peak survey period ridership base of 12,346 ferry users, or an average expansion factor, inclusive of the boarding factor, of 6.28.

2.3 SURVEY PRECISION ESTIMATES

Given the survey response trends, this section sheds light on the accuracy or precision by which the survey sample results are representative of the true underlying population of ferry riders. It is divided into sections covering a technical discussion of sample precision and typical precision levels achieved by route.

2.3.1 Technical Discussion

Precision Levels, Confidence Intervals, and Population Parameters

It is useful to define a few terms that are key to this discussion. The first is precision, which refers to close the survey sample represents the characteristics of the underlying population. The population in this case is the universe of all ferry travelers during the defined survey period on the day in which the survey was conducted. While it is likely that the sample is also representative of a broader population of ferry riders beyond the survey period and day, especially since many riders are regular users and the survey month of May is the month most representative of annual ridership, precision levels can only be estimated in reference to the daily survey period population from which survey respondents were obtained. In addition, one must consider the confidence level of the precision estimates. A confidence interval of 95% implies that with repeated sampling of survey riders, 95 out of 100 samples will give sample estimates of population parameters that are within the specified precision range. In other words, the precision of a sample estimate of some

underlying population characteristic or parameter is a function of the population itself, the prescribed confidence level, and the size of the sample. A tightening of the desired precision level and/or increasing the confidence interval will require a larger sample.

The 1999 WSF Travel Survey covered multiple data collection objectives represented by the different questions or question components, each of which may require a different sample size to achieve a desired precision level at an acceptable confidence interval. For example, some questions serve to estimate population proportions — the percentage distribution of ferry users across a set of categories (e.g., distributions of trip purpose, type of ticket purchased, transit improvements desired, etc.), and some serve to estimate population means or averages (e.g., minutes waited for ferry, number of one-way rides in the last week, amount paid for parking, people in vehicle, etc.) Furthermore, some questions seeking population means which are later transformed to category ranges, such as respondent age, then require population proportion precision estimates. It is important to consider the results for which precision levels are desired, as the formulas for estimating the sample precision are different when estimating population proportions than for population means.

Absolute versus Relative Precision Estimates

Finally, there are two types of precision levels to consider: absolute precision and relative precision. Consider hypothetical survey results for trip purpose, where 20% of respondents indicated a trip purpose of work/school. Absolute precision levels consider a range about the sample estimate measured in the units of the parameter being estimated. Thus an absolute precision level of ±5%, at a 95% confidence level, would mean that with 95% certainty in this sample, the true share of work/school trip purposes lies between 15% and 25%. Conversely, relative precision levels measures the percentage deviation about the sample estimate. Thus a relative precision level of ±5%, at a 95% confidence level, implies that with 95% certainty in this sample, the true share of work/school trip purposes lies between 19% and 21%. In this case, a relative precision level of ±5% would require a larger sample than an absolute precision level, since it provides an overall lower margin of error.

2.3.2 Route Level Precision Estimates

Table 2-2 presents the effective absolute precision levels for population proportion estimates by route for the PM peak period. These precision values apply to simple proportion distribution tabulations for each route across all boarding methods. In general, the determination of the precision level achieved for a survey sample estimate representing the survey ridership population really requires an application-specific calculation. For instance, the results of a particular cross-tabulation of two survey questions or a single question by boarding method each represent unique subsets of the ridership population and sampled survey data. Given a statistical sample and the type of estimate it represents (population proportion or population mean), an absolute and/or relative precision range can then be uniquely estimated. Since all cases are different, it is not possible to provide all of the hundreds of combinations of precision levels for the various routes, directions, boarding modes, survey periods, etc.

Table 2-2
Survey Distribution, Response and Precision Statistics — Weekday PM Peak Period

Route	*Estimated Survey Day Ridership*	*PM Peak Survey Period Ridership*	*PM Peak Surveys Distributed*	*PM Peak Returned Surveys*	*PM Peak Usable Surveys[1]*	*Usable Sample Share of PM Peak Ridership*	*Sample Req'd for Pop. Proportion ± 5% Absolute Precision Range[2]*	*Expected Absolute Precision Range for Estimating Pop. Proportions*
Pt. Defiance–Tahlequah	2,188	689	627	286	235	34%	247	± 5.2%
Fauntleroy–Vashon	5,340	1968	1,862	419	399	20%	322	± 4.4%
Fauntleroy–Southworth	2,803	1015	1,013	289	276	27%	279	± 5.0%
Southworth–Vashon	1,214	366	310	90	83	23%	188	± 9.5%
Seattle–Vashon PO	1,220	322	223	130	126	39%	176	± 6.8%
Seattle–Southworth PO*	N/A	304	247	126	126	41%	170	± 6.7%
Seattle–Bremerton	5,725	1879	1,518	662	541	29%	319	± 3.6%
Seattle–Bremerton PO	3,522	1277	1,049	622	459	36%	295	± 3.7%
Seattle–Bainbridge Island	19,524	7206	5,730	2,918	2,396	33%	365	± 1.6%
Edmonds–Kingston	11,076	3314	3,018	1,121	1,014	31%	344	± 2.6%
Mukilteo–Clinton	10,486	3391	2,077	968	828	24%	345	± 3.0%
Pt. Townsend–Keystone	1,509	450	378	189	173	38%	207	± 5.9%
Anacortes–San Juan Islands[3]	3,666	4010	1,807	698	610	15%	351	± 3.7%
Anacortes–Sidney B.C.[3]	287	302	456	177	159	53%	169	± 5.4%
System Totals	**68,560**	**26,494**	**20,315**	**8,695**	**7,425**	**28%**	**3,777**	**± 1.0%**

Footnotes

[1] Returned surveys meeting completeness criteria: "good" origin & destination information, plus data for trip purpose, boarding method, access & egress modes.

[2] Absolute Precision estimated were adjusted by the finite population correction factor on all routes.

[3] The "PM Peak Period" for the Anacortes-San Juan Islands and Anacortes-Sidney B.C. routes is defined as the entire day due to the headways and the recreational travel in the San Juans. The survey day ridership estimate excludes inter-island walk-on boardings on the domestic route.

* Includes riders traveling on both the Seattle-Vashon and Southworth Vashon routes via a transfer on Vashon. This travel is modeled as if it were a unique route.

Comments

• Sample sizes required for absolute or relative precision when estimating population means (averages) will vary with the range of responses to each question.

On most routes, the absolute precision level achieved for the PM peak period survey was less than ±5%. For a few of the short routes, the survey period ridership populations are too small to achieve usable sample precision levels under ±5%; however, sampling on more than one day to improve this situation creates another set of statistical problems due to sampling with replacement (sampling some riders more than once.)

Note that tabulations of the overall system data provide very precise estimates of the total PM peak period ridership population.

2.3.3 Sample Share of Survey Population

Table 2-2 also presents the general usable response sample share of the total PM peak survey period ridership (survey population) for each route and the system as a whole. In general, the usable survey sample — which was restricted to riders age 15 and older — represents 28% of the total ridership during the 3-7 PM peak period survey window. Put another way, 28% represents the PM peak period general usable response rate as measured against the actual ridership rather than relative to the number of surveys distributed as indicated in Table 2-1. Regardless of measurement techniques, the sample shares or response rates realized for the WSF Travel Survey, especially during the critical PM peak period survey, are above average for voluntary travel surveys.

2.4 WSF GEOGRAPHIC ZONE SYSTEM

This section describes the geographic information system (GIS) elements of the 1999 WSF Travel Survey, including the geocoding of addresses to latitude-longitude (X-Y) coordinates and the revisions made to the existing WSF Transportation Analysis Zone (TAZ) system.

2.4.1 Geocoding Process and GIS Application

Home, origin, and destination addresses reported by survey respondents were geocoded to latitude-longitude (X-Y) coordinates in the ArcView GIS software application. Utilizing street coverage files derived from 1997 U.S. Census Bureau TIGER Line files, addresses were geocoded through a combination of batch (automated) and interactive (one address at a time) processes. Geocoding quality control measures included extensive visual checks for location accuracy, comparison of the geocoded zip code with the zip code given by the respondent, and comparison of the given direction of travel with that indicated by the geocoded origin and destination.

2.4.2 WSF TAZ System and District Schemes

Transportation Analysis Zone (TAZ) System

The Transportation Analysis Zone (TAZ) system used for this study was largely adapted from the existing Puget Sound Regional Council (PSRC) TAZ system. Specifically, the PSRC TAZ boundaries were adopted for counties within the PSRC region (King, Pierce, Snohomish, and Kitsap Counties). Zones external to the PSRC TAZ system in the eight outlying counties (Clallam, Jefferson, Island, Mason, San Juan, Skagit, Thurston, and Whatcom) were sized and developed to reflect concentrations of activities (e.g., population) within each county. The process of developing the WSF TAZ system involved:

- Using previous 1993 WSF TAZ boundaries as a guide/starting point;
- Clustering tracts with similar population densities (e.g., tracts that form the City of Olympia, although not necessarily following the exact boundary of the city);
- Geographic divisions (e.g., West Clallam County, Central Clallam County, and East Clallam County); and
- Creating one analysis zone per San Juan Island ferry terminal (i.e., Anacortes, Lopez, San Juan, Shaw, Orcas).

Finally, external TAZs were created to represent areas in Washington State but outside of the study area, other states in the U.S., and certain parts in British Columbia, Canada.

Geocoded home, origin, and destination addresses were assigned to the WSF TAZ system utilizing a spatial join in ArcView GIS. This is an automated GIS function which locates each geocoded address on the TAZ map and assigns the appropriate TAZ number to that record. For those addresses located outside of the study area, external TAZs were assigned manually.

System and Route-Specific District Schemes

TAZs were aggregated into districts for purposes of analyzing and presenting survey results. Although a general district scheme for the entire system was developed, emphasis was placed on developing route-specific district schemes for travel analysis presentation at the route level. The route-specific districts were sized with the intention of providing more detail closer to the route's ferry terminals. TAZ-to-district equivalency tables for the system and route-specific district schemes are included in Appendix D.

2.4.3 Using Geocoded Trip Origin and Destination Information

The geocoded data were used not only to analyze and present the travel survey results, but also to conduct various quality control checks among the survey data records. Quality control procedures included viewing the geocoded data in ArcView GIS to assess the reasonableness of origin and destination locations, given other characteristics about the trip. Survey results were then analyzed and presented by mapping home, origin, and destination locations with the use of X-Y coordinates and showing those locations as individual points on a map. In addition, maps showing district schemes were used to analyze and present survey results in terms of district share of trip origins and trip destinations. These maps correspond to trip tables presented by survey period, route, and direction herein.

The expanded origin-destination pairs from the survey database will also be used to develop revised WSF EMME/2 model compatible person- and vehicle-trip tables. It is proposed to use these trip tables in updating/refining the WSF EMME/2 model.